

What we claim is:

1. A network management apparatus comprising:

a storage for storing network configuration information indicating a connection state of a plurality of network elements, QoS guarantee capability information indicating a QoS guarantee capability of the network elements, and flow identifier assignment capability information indicating a flow identifier assignable by the network elements;

a QoS guarantee path route candidate retriever for retrieving a route enabling a predetermined QoS to be guaranteed or a route enabling the predetermined QoS to be guaranteed by being newly assigned with the flow identifier from among routes between a source and a destination network elements based on the network configuration information, the QoS guarantee capability information, and the flow identifier assignment capability information, and for preparing QoS guarantee setting information and predetermined flow identifier assignment setting information provided to the network elements on the retrieved route; and

a QoS guarantee path establishing portion for performing the QoS guarantee setting and the flow identifier assignment setting to the network elements.

2. The network management apparatus as claimed in claim 1 wherein the storage further includes network element setting information of the network elements composed of the QoS guarantee setting information and the predetermined flow identifier assignment setting information prepared by the QoS guarantee path route candidate retriever; and the QoS guarantee path establishing portion performs, based on the network element setting information, the QoS guarantee setting and the flow identifier assignment setting of the network elements.

3. The network management apparatus as claimed in claim 1

wherein the QoS guarantee path establishing portion stores a flow identifier value determined by the network element to which either the QoS guarantee setting or the flow identifier assignment setting has been performed, and makes the flow identifier value an identifier value set in other network elements.

4. The network management apparatus as claimed in claim 1 wherein upon failing to establish a QoS guarantee path of a network resource securing type, the QoS guarantee path establishing portion establishes a next QoS guarantee path retrieved by the QoS guarantee path route candidate retriever.

5. The network management apparatus as claimed in claim 1 wherein in presence of a plurality of routes enabling the predetermined QoS to be guaranteed, the QoS guarantee path establishing portion selects a single route from among the routes according to a preliminarily designated selection method.

6. The network management apparatus as claimed in claim 1 wherein the QoS guarantee capability information further indicates a QoS guarantee capability of a sub-network composed of a plurality of network elements.

7. The network management apparatus as claimed in claim 6 wherein the QoS guarantee capability information further indicates a QoS guarantee capability of a sub-network composed of a plurality of network elements whose treatable flow identifiers are coincident with each other.

8. The network management apparatus as claimed in claim 6 wherein the sub-network comprises a network of other carriers.

9. The network management apparatus as claimed in claim 1 wherein the QoS guarantee path route candidate retriever retrieves, as a route enabling the predetermined QoS to be guaranteed by being assigned with the flow identifier, a route having no network element which deletes the flow identifier between a network element assigning

the flow identifier and a network element guaranteeing a QoS based on the flow identifier.

10. The network management apparatus as claimed in claim 1 wherein the QoS guarantee path route candidate retriever specifies, as
5 a route enabling the predetermined QoS to be guaranteed by being assigned with the flow identifier, a network element which deletes the flow identifier per classification of a flow identifier, and retrieves a route to a network element having a capability to assign the deleted flow identifier.

10 11. The network management apparatus as claimed in claim 1 wherein the QoS guarantee path establishing portion establishes one or more paths having a preliminarily guaranteed QoS to a network element, and stores QoS guarantee setting information and flow identifiers of the paths, thereby selecting a route enabling the QoS to
15 be guaranteed, based on the QoS guarantee setting information, from among the paths when the predetermined QoS guarantee is requested, and setting another network element so that the flow identifier of the path is used.